

THE MISSOURI BEE-KILLER, PROCTACANTHUS MILBERTII MACQ. (ASILIDAE: DIPTERA).

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Proctacanthus milbertii Macquart is a widely distributed large Asilid occurring from Mexico to British Columbia east to Ontario, Ohio, Virginia, and Florida. *Milbertii* has for its habitat fields, pastures and dry prairies where the soil contains a considerable admixture of sand. Alighting on or near the ground, *milbertii* is always conspicuous because of its active flight and sonorous buzzing. In Southern Alabama, Colonel F. S. Blanton stated that it has received the common name of "Boo-hoo" fly. In a pasture in Missouri in 1923 where this species was particularly abundant I called it to the attention of a farmer explaining what it was and what it did. "Well, what do you know?" he said when I had finished, "I always thought they were a kind of horse fly!" In this he was anticipated a couple of centuries by the great Linnaeus who gave this group of flies the name *Asilus* (the ancient name for flies which tormented cattle) in the belief that they were molesters of stock and cattle, a habit in which no robber fly today is known to indulge. In his 2nd Annual Report on Missouri Insects, p. 123, 1870, C. V. Riley described the present species as *Asilus missouriensis*, calling it the "Missouri Bee-killer" in the belief that it preyed principally on the honey-bee. That this was an erroneous impression, I pointed out in my paper on Bee-killing Robber flies, *Journal of the N. Y. Ent. Society*, 38, 172 (1930).

In the present paper, reviewing a compilation of 659 prey records, honey-bees comprise less than 4% of the total. *Milbertii* prefers Lepidoptera and Orthoptera which comprise 75% of its prey. Its attacks on other groups of insects are more or less perfunctory and usually occur in the absence of its favorite prey. In the field these flies are constantly seen to betray interest in grasshoppers, butterflies and moths, giving chase the instant they are sighted. The honey-bee prey listed in the present paper were taken under special conditions where the bees were forced to fly close to the earth in cut clover or alfalfa fields where blossoms were within a few inches of the ground.

It is of interest to note the similarity in the type of prey chosen by *milbertii* and the African *Alcimus setifemoratus* Hobby, another large, slender, streamlined species of similar size which was re-

corded by Hobby as feeding on Lepidoptera and Orthoptera in 71% of 231 instances of preying (Hobby, B. M. Rhodesian Asilidae and their Prey collected by C. F. M. Swynnerton: Jour. Animal Ecology, 4, 1, pp. 90-112, May, 1935).

"Give a dog a bad name and hang him." This old saying has certainly applied to *Protacanthus milbertii*. The name "Missouri bee-killer" still sticks. In Missouri (1923) I found apiarists destroying *P. milbertii* by the scores because they thought it killed their bees. I tried to track down a bona fide case of bee-killing at that time but was unable to do so.

During the summer of 1946, Dr. Haseman, Mr. Enns and Mr. Craig all looked diligently for a case of *Milbertii* catching honey-bees in Missouri and found only one! In the course of the summer they found *Mallophora orcina* feeding on honey-bees on 5 occasions, *Diognites salutans* twice and *Promachus hinei* once. My friends in Texas have been on the look-out for a *milbertii* with honey-bee prey since 1932 and to date none has materialized. Quite evidently, *milbertii* is of little or no consequence as a bee-killer, at least as compared with *Saropogon dispar*, *Mallophora orcina*, *Diognites symmachus* and *D. angustipennis* all of which frequently cause losses to apiarists in Texas.

Milbertii does not occur in the Northeastern states where its place is taken by the closely related *P. philadelphicus*, much more of a bee-killer, although even here the killing of bees never reaches economic importance.

PREY OF PROCTACANTHUS MILBERTII

LEPIDOPTERA. 260 records.

Cotton leaf-worm moth, *Alabama argillacea* Hbn. 55, College Station, Texas, Sept. 1933, in large cow-pasture (SWB). 1, Sept. 27, '33, same locality (H. J. Reinhard), 1, Sept. 21, '33 (H. J. Reinhard). Cotton leaf worm larvae, 1885 Report on Cottonworm, Rept. 4, U. S. Ent. Commission p. 99 (C. V. Riley).

Cotton Bollworm moth, *Heliothis obsoleta* Fabr. 19, College Station, Texas, Sept. 1933, in large cow pasture (SWB). 3, same locality, Sept. '32, in *Andropogon* prairie (SWB). 2, Forestburg, Texas, 9-17 to 9-21, '41 (L. H. Bridwell).

Cabbage butterfly, *Pieris rapae* L. 40 + Cook, Manual of Apiary, p. 415 Michigan (1888). 24, Columbia, Mo., Aug. 1923, in

old field near vegetable garden (SWB). 32, East Lansing, Mich., July–Sept. '34 (in old field next to a cabbage patch (SWB)).

Alfalfa butterfly, *Eurymus eurytheme* Boisd. U. S. D. A. Bull. 124, Aug. 28, 1914 (Wildermuth). 12, Columbia, Mo., July–Aug. '23, in cut alfalfa field (SWB).

Clover butterfly, *Eurymus philodice* Godt. 23, East Lansing, Mich., Aug. '34, in cut clover field (SWB).

Cutworm moth, *Agrotis ypsilon* Rott. 14, East Lansing, Mich., Aug. '34, in field near vegetable garden (SWB).

Fall armyworm moth, *Laphygma frugiperda* S. & A. 1, Columbia, Mo., Aug. '29, 1923 (SWB).

Hummingbird moth, *Hemaris thysbe* Fabr. 1, Lucas Co. Ohio, Aug. 21. (R. C. Osburn).

Buckeye butterfly, *Junonia coenia* Hbn. 4, Forestburg, Texas, 9–20 to 9–30, 1941 (L. H. Bridwell).

Skipper, *Apatelodes campestris* Bvd. 1, College Station, Texas, Sept. 17, '33 (SWB). 1, Columbia, Mo., Aug. 29, '23 (SWB).

Yellow skipper. 1, Columbia, Mo., Aug. 29, '23 (SWB).

Dried Clover Moth, *Hypsopygia costalis* Fabr. 1, College Station, Texas, Sept. 30, '32 (SWB).

Cosmopolitan butterfly, *Vanessa cardui* L. Clark Co. Ks. 1911 (F. X. Williams) Record from U. Ks. (Beamer).

Small yellow butterfly, *Eurema* sp. 1, College Station, Texas. Sept. 21, '33 (H. J. Reinhard). 5, same locality, Sept. 21–27, '33 (SWB).

Gulf fritillary, *Dione vanillae* L. 3, College Station, Texas. Sept. 21–27, '33 (SWB).

Swallow-tail butterfly, *Papilio philenor* L. 2, College Station, Texas, Sept. 21–27, '33 (SWB).

Blue lycaenid butterfly. 1, Columbia, Mo., Aug. 7, '23 (SWB).

Skipper, *Polites taurus* Fabr. 2, Columbia, Mo., Aug. 29, '23 (SWB).

Medium-sized skipper. 1913, late July or early August. Colfax Co. N. M. (W. R. Walton), Proc. U. S. N. M. vol. 48, p. 174, 1914.

Moth, *Neleucania albilinea* Hbn. 1, Columbia, Mo., Aug. 29, '23 (SWB).

ORTHOPTERA. 253 records.

Rocky Mountain locust, solitary phase, *Melanoplus mexicanus* Sauss. 42, College Station, Texas, Sept. '33 (SWB). 27, Columbia, Mo., Aug. '23, in former wheat plats (SWB). 24, East Lansing, Michigan, Aug., Sept., '34, in old field (SWB). 1, County 77, Iowa, Aug. 27, '36 (Bernard Berger).

Rocky Mountain locust, swarm phase, *Melanoplus spretus* Thomas. L. O. Howard, Century Dictionary, vol. IV, p. 2743, 1899 (1901 Copyright edition).

Red-legged grasshopper, *Melanoplus femur-rubrum* Deg. 24, Columbia, Mo., Aug. '23. 15, College Station, Texas, Sept. 1933 (SWB). 8, East Lansing, Michigan, Aug. '34 (SWB).

Melanoplus bispinosus Scudder. 51, College Station, Texas, Sept. 1933 (SWB) in large cow pasture.

Grasshopper nymphs. N. Mexico. Walton, *Proc. U. S. N. M.* vol. 48, 174, 1914.

Syrbula admirabilis Uhler. 2, Foresburg, Texas. Sept. 20 and 24, '41 (L. H. Bridwell). 2, Columbia, Mo., Aug. 8, '23 (SWB). 1, same locality, 8-24-40 (W. R. Enns).

Hippiscus rugosus (nymph). 1, Forestburg, Texas. Sept. 25, '41 (L. H. Bridwell).

Tettix sp. 1, Forestburg, Texas. 9-24-41 (L. H. Bridwell).

Mestobregma fuscifrons Stal. 12, College Station, Texas, Sept. 1933 (H. J. R. & SWB).

Spharagemon cristata. 6, College Station, Texas, Sept. 27, '33. (det. Little).

Cambylacantha olivacea Scudder (Det. Little) nymph. 1, College Station, Sept. 27, '33 (SWB).

Cammula pellucida Scudder. 11, East Lansing, Mich., Aug. 19-25, '34, in old field (SWB).

Trimerotropis citrina Scudder (Det. Little). 4, College Station, Texas, Sept. 1933 (SWB).

Cone-head, *Neoconocephalus* sp. 1, Columbia, Mo., Aug. 29, '23 (SWB).

Katydid, *Scudderia texensis* S & P (Det. Little). 1, College Station, Texas, Sept. 27, '33 (SWB).

Cricket, *Nemobius fasciatus* Deg. (Det. U. S. N. M.). E. Lansing, Mich., Aug. 11, '34 (SWB). Newtown, O. 8-25-38 (SWB).

HYMENOPTERA. 71 records.

Honeybee, *Apis mellifera* L. 4, Riley, "Missouri" (probably St. Louis) "Two males and two females, all captured while sucking honey-bees." 2nd Annual Report, State Entomologist, Missouri, p. 123 (1870). 1, Detroit, Mich. Mich. Agr. College. Collection. Oct. 1, 1910. 1, Grand Rapids, Mich. Oct. 11, 1915, Mich. Agr. Coll. Haseman, letter of July 30, 1946, "I have seen one kill and suck the blood from honey-bees in my own apiary in the country." Columbia, Missouri. 1, Craig, W. S. Sept. 11, '46. Columbia, Mo. 10, East Lansing, Mich., July-Sept. 1934. In cut sweet yellow clover fields (SWB). 1, Birch Run, Mich., Aug. 30, '34 (SWB) 2, Adams Township, Section 23, Lucas Co., Ohio, Aug. '35, in cornfield (R. T. Everly). 2, near Cincinnati, Ohio, Aug. 25, 1938, in dry, old fields near goldenrod (SWB).

Bumblebee (female) *Bombus americanorum* (Fabr.). 1, Forestburg, Texas, Sept. 25, '41 (L. H. Bridwell). 5 workers, College Station, Texas, Sept. 1933, near clumps of blossoming Buffalo bur in large cow pasture. (SWB).

Bumblebee (worker), *Bombus auricomus* Robts. 2, College Station, Texas, Sept. 1933, near clumps of blossoming Buffalo bur in large cow pasture. (SWB).

Bombus impatiens Cress. worker. 1, East Lansing, Michigan, Aug. 23, '34, in alfalfa field (SWB).

Bombus fervidus (Fabr.) worker. 1, East Lansing, Michigan, Aug. 4, '34, in alfalfa field. (SWB).

Bombus impatiens Cress. 1, Montgomery, Ohio, Aug. 25, '38, in goldenrod field (SWB).

Melon bee, *Melissodes bimaculata* (Lep.) 1, Adams Township, Section 23, Lucas Co., Ohio, Aug. 14, '35, in cornfield (R. T. Everly).

Sand bee, *Andrena aliciae* Robt. (det. U. S. N. M.) 1, East Lansing, Michigan, Aug. 12, '34 (SWB).

Halictus ligatus Say. (det. U. S. N. M.) 1, Columbia, Mo., Aug. 29, '23 (SWB). *Ceratina calcarata* Robt. (det. U. S. N. M.) 1, East Lansing, Mich., Aug. 26, '34 (SWB).

Megachile pollicaris Say (det. T. B. Mitchell). 1, College Station, Texas, Sept. 27, '33 (SWB).

Megachile latimanus Say (det. T. B. Mitchell). 1, E. Lansing, Mich., Aug. '34 (SWB).

Worker Yellowjackets. *Vespa maculifrons* Buy. 2, E. Lansing, Mich., Aug. 25, '34 (SWB). *Vespa arenaria* 2, Sandpoint, Huron Co., Mich., Sept. 9, '24 and Port Austin, Huron Co., Mich., Sept. 9, '24 (F. M. Gaige).

Brown Wasps. *Polistes variatus* Say. 1, East Lansing, Mich., Sept. '34 (SWB). *Polistes pallipes* Lep. 1, East Lansing, Mich. Sept. '34 (SWB). *Polistes canadensis* L. 1, Columbia, Mo., Sept. 16, '40 (W. R. Enns).

Spider wasps. 1, *Psammochares* sp. 1, Sanford, N. C., Oct. 5, '21 (T. B. Mitchell). 1, *Pompilus luctuosus* Cresson. 1, Forestburg, Texas, Sept. 25, '41 (L. H. Bridwell). 1, Port Austin, Huron Co., Mich., Aug. 28, '24 (F. M. Gaige).

Solitary wasps. *Cerceris* sp. 1, East Lansing, Mich., Aug. 5, '34 (SWB). 1, Columbia, Mo., Aug. 1923 (SWB). 1, College Station, Texas, Sept. 23, '33 (SWB). *Larropsis distincta* Sm. 2, East Lansing, Mich., Aug. 4 and 11, '34 (SWB). 1, Boonville, Mo., Sept. 16, '39 (W. R. Enns). *Lyroda subita* Say. (det. U. S. N. M.). 2, E. Lansing, Mich., Aug. 5 and 11, '34 (SWB). *Lestica producticollis* Pack. (det. U. S. N. M.). 1, E. Lansing, Mich., Aug. 5, '34 (SWB). *Astata leuthstromi* Ashm. 1, E. Lansing, Mich., Aug. 4, '34 (SWB). Sand wasp, *Sphex procerus* Dahlb. 1, College Station, Texas, Aug. 27, '33 (H. J. Reinhard). Sand hornet, *Bembix spinolae* Lep. 1, East Lansing, Mich., Aug. 16, '34 (SWB).

Parasitic wasps. *Tiphia inornata* Say. 2, Forestburg, Texas, Sept. 25, '41 (L. H. Bridwell). 1, Steuben Co. Indiana. Aug. '03 (U. S. Nat. Museum) *Amblyteles* sp. 1, E. Lansing, Mich., Sept. 9, '34 (SWB).

Ants. Black Ant, *Formica subsericea* Say. 1 female, 3 males, E. Lansing, Mich., Aug. 5 to 26, '34 (SWB). Brown ant, *Formica fusca* L. 2 males, E. Lansing, Mich., Aug. 3 and 11, '34 (SWB). Army ant, male, *Eciton opacithorax* Em., College Station, Texas, Sept. 28, '33 (SWB).

COLEOPTERA. 38 records

Colorado Potato Beetle, *Leptinotarsa deccmlineata* Say. Chittenden, Bureau Ent. Circ. 87, p. 11, 1907. 5, College Station, Texas, Sept. '33, near clumps of Buffalo bur in large cow pasture (SWB). 8, East Lansing, Mich. Aug.-Sept. '34, in cow pasture near potato field (SWB).

Spotted cucumber beetle, *Diabrotica duodecimpunctata* Fabr. 4, Columbia, Mo., Aug. 1923, in field near vegetable garden (SWB). 3, East Lansing, Mich. Aug.-Sept. '34, in field near vegetable garden (SWB).

Tiger Beetles. *Cicindela obsoleta* say. 6, College Station, Texas, Sept. '33, in sandy pasture (SWB). *Cicindela hirticollis* Say. 3, College Station, Texas, Sept. '33 (SWB). *Cicindela generosa* Dej. 2, Sandport, Huron Co., Mich., Sept. 13, '27 and Port Austin, Mich., Aug. 26, '34 (F. M. Gaige). *Cicindela purpurea* Oliv. 1, Beachland, B. C. Wallis, Can. Ent. May 1913, vol. XLV, 5, p. 135. *Cicindela 12-guttata* Dej. Davis, J. J. Nat. Hist. Survey Illinois, Bull. XIII, Article V, p. 89, 1919.

Tumble bugs. *Canthou laevis* Drury. 2, College Station, Texas, Aug. 27, '33 (H. J. Reinhard).

Bumble beetles. *Euphoria inda* L. 1, East Lansing, Mich. Aug. 23, '34 (SWB). *Amphicoma* sp. 2, Forestburg, Texas, Oct. 1 and 4, '41 (L. H. Bridwell).

DIPTERA. 36 records.

Carrion Screw-worm fly, *Cochlyomyia macellaria* Fabr. 8, College Station, Texas, Sept. '33 near dead opossum in large cow pasture. (SWB). 11, East Lansing, Mich. Aug. 25 and 28, '34, near dead cow in dry gully. (SWB).

Robber flies. Bee-catcher, *Diognites symnachus* Loew. 2, College Station, Texas. Sept. 14, '33 (T. McGregor) and Sept. 27, '33 (SWB). Field Fly-hawk, *Erax rufibarbis* Macq. 2, College Station, Texas, Sept. 27 and 28, '33 (SWB) and 2, Sept. 19, '33 (H. J. Reinhard). *Asilus paropus* Walker. 2, East Lansing, Mich. Aug. 15 and 18, '34 (SWB). *Stichopogon trifasciatus* Say. 1, Forestburg, Texas, Sept. 27, '41 (L. H. Bridwell). *Proctacanthus milbertii* Macq. 1, a male killed by a female, East Lansing, Mich., Aug. 11, '34 (SWB). *Asilus sadyates* Walker. 1, Aug. 26, '34, East Lansing, Mich. (SWB). *

- Bee flies. *Villa* sp. 1, E. Lansing, Mich. Aug. 11, '34 (SWB).
Systocchus vulgaris Loew. 1, East Lansing, Mich. Aug. 25, '34 (SWB).
 Flesh fly, *Sarcophaga communis* Park. 1, Milford, Ohio Aug. 25, '38 (SWB).
 Drone fly, *Eristalis vinctorum* Fabr. 1, College Station, Texas, Sept. 21, '33 (H. J. Reinhard). 1, Small Tachinid fly, *Zenillia* sp., College Station, Texas, Sept. 21, '33 (H. J. Reinhard).

HEMIPTERA-HOMOPTERA. 19 records.

- Squash-bug, *Anasa tristis* DeGeer. 6, East Lansing, Mich., Sept. 1934, along large field of squash (SWB).
 Stink bugs. *Euschistus servus* Say. 4, Adams Township, Ohio, Aug. 1935 (R. T. Everley) *Peribalus limbolaris* Stal. 1, East Lansing Mich., Aug. 11, '34 (SWB) (det. U. S. N. M.) *Cosmopepla bimaculata* Thomas (det. U. S. N. M.) 1, East Lansing, Mich. Aug. 5, '34 (SWB). *Hymenarcys aequalis* Say (det. U. S. N. M.) East Lansing, Aug. 5, '34 (SWB).
 Treebug, *Brochymena 4-pustulata* Fabr. 1, East Lansing, Mich., Aug. 5, '34 (SWB). Bush-clover stink-bug, *Alydus eurinus* Say. 2, East Lansing, Mich., Aug. 12-18, '34 (SWB).
 Leafhopper, *Gypona* sp. (det. U. S. N. M.) East Lansing, Mich., Aug. '34 (SWB).
 Buffalo Tree-hopper, *Ceresa bubalus* Fabr. 1, East Lansing, Mich., Aug. 12, '34 (SWB).

ODONATA. 1 record.

- Aeschna tuberculata* Walker. 1, East Lansing, Mich., Aug. 1934 (SWB). The dragon fly was hit by the rim of the collector's net, injuring the abdomen, so that it mounted in circles skyward and then circled slowly toward the ground. About four feet from the ground it seemed to drop suddenly. An investigation disclosed that the dragon fly had been seized by the Asilid which was now resting on the ground with the big *Aeschna* in its grasp. The incident was very reminiscent of an observation made by Dr. Robert B. Gordon in North Central Ohio a number of years ago. A good sized chicken was hit by a car and, although badly injured, was not killed. A cooper hawk struck the flopping bird and finished it off, demonstrating that predatory creatures sense weakness or injury in their prey and that such weakness will facilitate their capture.